TREES USED SIMULTANEOUSLY AND SEQUENTIALLY BY BREEDING CAVITY-NESTING BIRDS

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ABSTRACT.—We characterize 14 trees used simultaneously and sequentially by breeding cavity-nesting birds in Wyoming cottonwood communities. Our descriptions can be used as a management resource to enrich the diversity of breeding assemblages of these bird species.

During our three-season (1982–1984) study along the North Platte and Laramie rivers between Guernsey and Fort Laramie in Platte and Goshen counties, Wyoming, we observed various bird species nesting in decayed substrates (trees, limbs, or boles) that were simultaneously or previously occupied by other breeding hole nesters. These observations highlight behavioral phenomena that increase species richness and density in breeding communities of cavity-nesting birds. Habitat patches with individual trees that are used simultaneously or sequentially by several cavity-nesting species have higher species richness and density during the breeding season than patches without such substrates (Gutzwiller 1985). The cottonwood (*Populus*) communities we studied (and probably many other plant communities) would support fewer nesting individuals and species in the absence of repeated tree use. In this note, we characterize nesting substrates associated with the phenomena of simultaneous and sequential nesting. Our purpose is to provide habitat information useful to those who wish to improve species richness and density of cavity-nesting birds in western riparian cottonwood communities.

Only 14 of 173 (8%) active nest trees received repeated use during the three breeding seasons; 7 trees were used simultaneously, 4 were used sequentially from year to year, and 3 were used sequentially within a single breeding season (Table 1). We searched for nests and observed behavior around nests for a total of approximately 720 h; yet we detected little intraspecific and interspecific aggression near nest cavities, despite considerable overlap in habitat use (Gutzwiller 1985) and the close proximity of many nests. Once we saw a pair of American Kestrels chase an adult male American Kestrel away from their cavity. Twice we observed individual Red-headed Woodpeckers enlarging the entrances of active Downy Woodpecker nests; the latter species (a pair in each case) attacked the former continuously, and neither species nested in the cavities afterward. One other time we saw a pair of Red-headed Woodpeckers defending their nest hole by chasing several European Starlings that approached the nest entrance or the branches of the nest tree.

We attribute this general lack of aggression, in part, to an abundance of suitable cavities, not all of which were occupied each year. Most (159 of 173) (92%) of the nest substrates we examined were not used more than once or occupied by more than one species during our three-season study; those that were used more frequently (Table 1) were, presumably, more attractive to various species than other available substrates. This lack of aggression among individuals nesting in close proximity supports other reports of cavity nesters breeding harmoniously in similar circumstances (Hoyt 1957, Reller 1972, Jackson 1978). Short (1979: 25) explained that "Despite intense aggression between competitors for nesting sites, such competitors at least occasionally appear 'satisfied' once they have secured a nesting site [cavity], and there are many reports of nesting in proximity of usually aggressive nest-hole competitors. . . ." Another reason we detected little territorial aggression

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TABLE 1. Structural and floristic attributes of 14 nest trees used simultaneously and sequentially by cavity-nesting birds in southeastern Wyoming, 1982–1984.

Bird species[a]	Substrate use[b]	Tree species[c]	Nest height (m)	Diameter at breast height (cm)	Diameter at nest height (cm)	Nest locations	Nest entrance diameter (cm)	Nest entrance orientation[d]	Nest entrance bearing[e] (°)
AMKE, EUST	SIM	PLCO	9.0, 11.9	133.6	—, —[f]	limb[g]	—, —	A,A	243, 295
AMKE, EUST, REWO	SIM	PLCO	16.0, 17.8, 15.0	93.7	—, —, —	limb	—, 5.6, 7.0	A,B,B	2, 16, 49
AMKE, REWO	SIM	UNKN	7.4, 8.2	49.6	38.1, 25.4	bole	5.0, 6.0	B,A	238, 72
NOFL, EUST	SIM	PLCO	10.7, 9.7	37.3	25.4, 40.6	bole	5.8, 6.1	B,H	214, 168
REWO, EUST	SIM	UNKN	15.4, 11.0	71.2	—, —	limb	4.8, —	H,A	18, 329
HAWO, HOWR	SIM	PEWI	4.5, 5.1	22.5	17.8, 15.2	bole	5.0, 6.1	B,B	159, 159
DOWO, NOFL	SIM	PLCO	16.4, 11.4	66.2	12.7, 25.4	limb[g]	3.2, 4.7	B,B	114, 2
COGR, EUST	SEQ(C)	PLCO	18.3, 20.3	94.8	30.5, 30.5	limb	10.2, 5.6	A,B	355, 12
DOWO, DOWO	SEQ(C)	UNKN	5.0, 4.4	18.5	—, 15.2	bole	3.8, 3.6	B,B	147, 148
DOWO, DOWO	SEQ(C)	UNKN	3.7, 3.1	17.5	12.7, 12.7	bole	4.0, 3.3	B,B	283, 285
REWO, REWO	SEQ(C)	UNKN	6.7, 6.1	43.6	25.4, 33.0	limb[g]	—, —	A,A	—, —
EUST, NOFL	SEQ(S,H)	PLCO	11.5	62.2	20.3	limb	8.3	B	200
DOWO, HOWR	SEQ(S,H)	PLCO	8.3	110.0	7.6	limb	2.0	B	339
DOWO, HOWR	SEQ(S,H)	NACO	7.1	43.8	15.2	limb	3.0	B	269

[a]COGR = Common Grackle (*Quiscalus quiscula*), EUST = European Starling (*Sturnus vulgaris*), AMKE = American Kestrel (*Falco sparverius*), REWO = Red-headed Woodpecker (*Melanerpes erythrocephalus*), NOFL = Northern Flicker (*Colaptes auratus cafer*), DOWO = Downy Woodpecker (*Picoides pubescens*), HOWR = House Wren (*Troglodytes aedon*), HAWO = Hairy Woodpecker (*P. villosus*). Bird names are from American Ornithologists' Union (1983). For sequential nesting, order of mnemonics reflects nesting sequence.

[b]SIM = simultaneous, SEQ(C) = sequential use during consecutive breeding seasons, SEQ(S,H) = sequential use of the same nest hole within a single breeding season.

[c]PLCO = plains cottonwood (*Populus sargentii* Dode); UNKN = dead tree, species unknown; PEWI = peachleaf willow (*Salix amygdaloides* Anderss.), NACO = narrowleaf cottonwood (*P. angustifolia* James). Plant names are from Dorn (1977).

[d]A = entrance pointed above horizontal, H = entrance pointed horizontally, B = entrance pointed below horizontal.

[e]Adjusted for 13° easterly declination.

[f]— = data not available.

[g]nests occurred in different limbs.

might be that dominance hierarchies were established through agonistic interaction before we discovered species nesting together. Nevertheless, this probably does not account for the paucity of aggression we noticed overall, unless dominance hierarchies were established quickly, and we happened to miss seeing all of them.

Sequential use of cavities and simultaneous and sequential use of nest trees are not rare events (e.g., Brewster 1893, Bent 1948, 1950, Lawrence 1967), presumably because hole nesters (particularly secondary cavity nesters) are versatile with respect to what constitutes a satisfactory nest substrate and because such substrates are typically limited. However, repeated substrate use in our study area was not common (occurred only 8% of the time), probably because of an abundance of suitable nest trees. Our note describes tree characteristics associated with simultaneous and sequential nesting, thus focusing on features found acceptable, either synchronously or repeatedly, by as many as three species. Such acceptance of these traits increases species richness and evenness (overall diversity) in breeding communities of hole-nesting birds (Gutzwiller 1985). Our nest-tree descriptions can, therefore, be used to attract and maintain greater diversity in breeding assemblages of these species.

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